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Cover Crop C-values for No-till Peanut

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INTRODUCTION

Peanut is a valuable cash crop grown in the southeastern United States and New Mexico. Currently, producers with a quota allotment are guaranteed \$678 per ton. Therefore, fields are plowed and cultivated extensively to maintain high yields.

Peanut fields may lose 31 tons/acre/year (Grenada silt loam, 3% slope, 300 foot length, no mechanical conservation practice) due to soil disturbance at planting and harvesting and little or no residue left on the soil surface after harvest. Cotton, another intensively tilled crop with little crop residue, may lose 21 tons/acre/year.

Previous studies across the Southeast have shown that peanut can be successfully grown using conservation tillage. A study was conducted to evaluate compatible cover crops (crimson clover, hairy vetch, rye, and wheat) in a conservation tilled peanut system and to calculate C-factors for each cover crop.

MATERIALS AND METHODS

Seedbeds for the cover crops were prepared by disking twice (2X), hipping 2X, and lightly harrowing. Phosphorus and potassium were broadcast applied according to soil test results for peanut. Cover crops were broadcast planted on November 6, 1991 at 20, 30, 90, and 90 lb/acre for crimson clover, hairy vetch, rye, and wheat, respectively. Hoelon, was applied at 0.75 lb ai/acre on December 17, 1991 to all plots to control ryegrass. Subsequent planting dates were October 8, 1992 and October 28, 1993. Seeding rates were reduced to 15, 20, 60, and 60 lb/acre for crimson clover, hairy vetch, rye, and wheat, respectively, in 1992 and 1993. Legume seeds were inoculated with the proper rhizobia prior to planting each year. Disking 2X, hipping, and harrowing in the spring served as a conventional tillage (CT) check. Canopy cover was determined by visually estimating the amount of cover in each plot. Dry matter (DM) yields were determined by hand harvesting four square feet in each plot prior to cover crop termination. Native cool season weeds varied from year to year, essentially none in 1991-1992, but mainly consisted of henbit, chickweed, and cutleaf evening primrose. Cover crops were chemically killed using Roundup, applied at 2.0 lb ai/acre on approximately April 15 of each year.

Spanish type peanut 'Florunner' was planted on May 12, 1992, May 20, 1993, and May 8, 1994 at 80 lb/acre. Plots were replanted June 15, 1994 due to birds pulling up the seedlings. Seed were planted using a no-till planter with a ripple coulter. Dual, at 2.0 lb

ai/acre was applied preemergence with paraquat applied postemergence over-the-top at 0.13 lb ai/acre. Conventionally tilled plots were cultivated once.

RESULTS AND DISCUSSION

Though planted after the last recommended planting date of October 15 (Kimbrough and Watson, 1988) in 1991 and 1993, the legumes emerged to satisfactory stands. Rye and wheat produced fair stands.

Crimson clover produced more canopy cover on all three dates in 1992 than did wheat (Table 1). In an earlier study at this location, canopy cover for rye and wheat during February and March was significantly higher than crimson clover (Bloodworth and Wolfe, 1992). In that study, crimson clover was affected more by cold temperatures than hairy vetch, rye, or wheat. Low canopy cover for native weeds on March 11, 1994 was attributed to water standing in the row middles covering plants that were still in the rosette stage. Hairy vetch, which has been shown to fix more N than crimson clover (Funderburg, 1987), did not produce >40% canopy cover until April of any year.

Table 1. Cover crop canopy cover, 1992-1994.

Cover crop	1/31	Canopy cover							
		1992	1993				1994		
		3/04	4/06	2/02	3/01	4/06	2/01	3/11	4/08
					%				
Crimson clover	21a ¹	59a	93a	25cd	11c	41b	14ab	15b	37b
Hairy vetch	4c	14d	84a	5d	7c	45b	8b	8bc	74a
Rye	17a	45b	70ab	40bc	21b	37b	31a	35a	78a
Wheat	12b	29c	41b	55ab	50a	50b	30a	40a	85a
Native cover	-	-	-	76a	59a	92a	18ab	3c	21b

¹Means within a column not followed by a common letter are significantly different as determined by DMRT ($P \leq 0.05$).

Crimson clover produced a higher DM yield than wheat only in 1992 (Table 2). No significant differences were found between cover crops for DM yield in 1993 or 1994. Bloodworth and Johnson (1992) reported that when fertilized with 25 lb N/acre, wheat following cotton produced DM yields equal to or higher than crimson clover.

No significant differences were found between cover crops for peanut seed yields (data not shown).

C-factors ranged in value from 0.282 to 0.481 for no-till peanut with rye and conventionally tilled peanut with native cover, respectively (Table 3). These are relatively higher than most other row crops due to soil disturbance during harvest and low residue levels remaining on the surface during the high E.I. period.

Table 2. Cover crop dry matter yield, 1992-1994.

Cover crop	4/22/92	DM yield	
		4/23/93	4/20/94
		lb/acre	
Crimson clover	4563a ¹	3328	2692
Hairy vetch	3586ab	4029	4396
Rye	4060ab	3915	4480
Wheat	2812b	3832	4581
Native cover	----	2866	3982_

¹Means within a column not followed by a common letter are significantly different as determined by DMRT ($P \leq 0.05$).

Table 3. Tillage system C-factors.

Tillage_system	C-factor
1. Seedbed preparation October 15, 2x disk, 1x chisel, hip 2x, harrow, plant crimson clover - April 15 burndown, no-till plant May 1. no cultivation.	.331
2. Same as No. 1 except plant hairy vetch.	.346
3. Same as No. 1 except plant rye.	.282
4. Same as No. 1 except plant wheat.	.293
5. Same as No. 1 except native winter cover	.379
6. No fall tillage. Native winter cover. Seedbed preparation April 15, 2x disk, 1x chisel, ip_2x,_harrow,_plant_May_1._1x_cultivate	.481

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